CONFERENCE ON DISARMAMENT

CD/985
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17 April 1990

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Ad hoc Committee on Chemical Weapons

POLAND

Provision of data relevant to the Chemical Weapons Convention

In order to contribute to the negotiations on the Chemical Weapons Convention, the Republic of Poland presents below data relevant to the future Convention in accordance with the format proposed in document CD/828 of 12 April 1988.

The data reflect the situation in Poland as at the end of 1989. The data on the production and/or use of chemicals relevant to the Convention were provided on a voluntary basis by the respective Polish bodies and institutions. The chemicals contained refer to the lists of the Schedules 1, 2 and 3 in document CD/952 of 18 August 1989. The thresholds for production and consumption were for Schedule 1 : 100 grams/per year, Schedule 2 : 1 tonne/year and Schedule 3 : 30 tonnes/year.

TABLE 1

Type of data	Response	Note
1. Presence of CW on own territory	No CW are located in the territory of Poland	
Possession of CW on territory of another State	No	
2. Aggregate number of facilities for the production and storage of CW	None	
Aggregate number of facilities for the production, processing and consumption of chemicals on Schedules 1, 2 and 3	8	1/
3. Types and names of CW agents	Poland neither produces nor possesses CW	
Types of CW munitions stored; CW agents stored in bulk	None	
Number and names of chemicals on Schedules 1, 2 and 3 produced in the chemical industry	6	2/
4. Plans and methods for the destruction of CW including the number of facilities and the anticipated length of their operation during the 10-year destruction period	None	

1/ Detailed information listed in table 2.

2/ The names of chemicals produced in Poland above the set level are listed in table 3.

TABLE 2

Detailed information on item 2 of table 1

Type of data	Annual quantity	Number of facilities
Schedule 1		
Production	more than 100 g but	1
Consumption	not more than 10 kg	2
Schedule 2		
Production	more than 1 tonne	None
Consumption	more than 1 tonne	None
Schedule 3		
Production	more than 30 tonnes	3
Consumption	more than 30 tonnes	5 */

*/ That figure contains three facilities producing Schedule 3 chemicals mentioned above.

TABLE 3

Schedule	Number of facilities	Produced chemicals	Note
Schedule 1	1	Mustard gas (H) (505-60-2) Lewisite	1/
Schedule 2	-	No	
Schedule 3	3	Phosgene (75-44-5) Hydrogen cyanide (74-90-8) Phosphorus trichloride (7719-12-2) Phosphorus oxychloride (10025-87-3)	

1/ The production of chemicals on Schedule 1 occurs in the Republic of Poland only for permitted purposes.

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CONFERENCE ON DISARMAMENT

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CANADA

National Trial Inspection at a Single Small-scale Facility

A. INTRODUCTION

During 1989 various countries carried out trial verification inspections on a national basis in their civilian chemical industry and reported the results to the Conference on Disarmament. The majority of these trials simulated routine inspections of chemical plants preparing key precursors currently listed on schedule 2A of the draft Convention on Chemical Weapons. More recently, some states, including the United Kingdom (CD/921) and the Federal Republic of Germany (CD/950), have reported trials of other types of inspections, such as challenge procedures and ad hoc verification and others are underway. Continuing this trend, Canada carried out in November 1989 a practice inspection at a simulated single small-scale facility (SSSF) where small amounts of schedule 1 chemicals have been prepared for protective purposes. The facility used for the trial is located at the Defence Research Establishment Suffield (DRES) in Alberta.

Canada does not possess any production facilities for chemicals currently listed on schedule 1. If such chemicals are needed, they are prepared in a standard organic synthesis research laboratory of the type found at many universities and research institutes. The research laboratory at DRES does not have any large reactors or permanently installed process equipment. Its capacity is limited to bench-scale synthesis. Such a facility would not pose the same threat to the goals of the chemical weapons convention as would a dedicated facility with larger production equipment, perhaps a pilot plant for which the model agreement provisions of the draft Convention (CD/952) seem to have been written. Thus the designation of the DRES laboratory as a single small-scale facility required a specific definition and careful adaptation of the procedures needed for routine inspections.

This working paper presents the results of a Canadian practice inspection held at the DRES research laboratory, part of which was defined as a single small-scale facility for the purpose of this trial.

B. GENERAL APPROACH

1. Aims and Objectives

The practice inspection provided an opportunity to examine and develop inspection procedures as a contribution to the work of the Conference on Disarmament. In addition, it was possible to explore the impact of such inspections on national programs, particularly those involving research into chemical protection, such as are carried out at the Defence Research Establishment Suffield.

The basic aims of the practice inspection were to evaluate the approach to verification at a single small-scale facility as outlined in the then current version of the rolling text (CD/952), to develop its application to a laboratory facility, to determine the problems created for the facility by the verification requirements, and to assess its applicability to this type of facility.

Specific verification objectives of the inspection were to demonstrate:

a) that the declarations made with respect to the facility were consistent with the obligations of the convention.

b) that the quantities of schedule 1 chemicals produced, stored, transferred, or consumed were within the prescribed national limits of 1 metric tonne; and

c) that the reaction vessels used in the facility were not designed for continuous operation and were of a volume not in excess of [10] [100] litres.

The Canadian trial simulated a routine periodic (annual) inspection. It was assumed that previous declarations, agreements, reports, etc., were available. Wherever practicable, this background information was simulated.

2. Relevant Provisions in the Draft Convention

The practice inspection was planned according to the provisions of Annex 1 to Article VI of CD/952, in particular those provisions pertaining to production at a

single small-scale facility. The model for an agreement relating to single small-scale facilities in Appendix II of CD/952 formed the basis for arrangements with the laboratory on access, assistance and additional information to be obtained. Guidance on inspection procedures was obtained from the guidelines for the international inspectorate in the Addendum to Appendix I and the draft protocol on inspection procedures in Appendix II.

3. Identification of the Single Small-Scale Facility

The simulated single small-scale facility involved in the practice inspection was defined as a single research laboratory located in a secure, specially ventilated suite within the main laboratory building at DRES. It was a standard organic synthesis laboratory equipped with five commercially available fumehoods with separate filtration and ventilation systems and a sixth fumehood specifically equipped for the secure storage of highly toxic chemicals. Associated supply systems, external storage areas, ventilation stacks and waste disposal areas were included in the facility description.

4. Type of Inspection

Examination of the provisions of the draft CWC suggested the following sequence of verification events for a single small-scale facility after entry into force of the Convention:

a) initial declaration of the single small-scale facility within thirty days;

b) initial inspection;

c) preparation of the facility agreement;

d) submission of the initial inspection report;

e) annual declarations of projected activities at the facility;

f) annual declarations of activities at the facility in the previous calendar year;

g) advance notification of changes to the facility;

h) routine periodic (annual) inspections; and

i) submission of inspectors' reports on routine inspections.

5. Initial Declaration

A simulated initial declaration was provided by the facility. This comprised: the location and detailed technical description of the facility required by Annex 1 to Article VI; a statement of the quantities of schedule 1 chemicals possessed as of the date of entry into force; and a list of schedule 2A chemicals and their quantities maintained as precursors for schedule 1 synthesis.

6. Initial Inspection

An initial inspection was not held prior to the trial. Instead, a planning group representing the facility, the inspectors, and the National Authority developed the required information over a two-day period prior to the inspection.

7. Facility Agreement

The necessary elements of the facility agreement were worked out during the planning session using as a basis the model for an agreement relating to single small-scale facilities, as outlined in the rolling text (CD/952).

8. Annual Declarations

Prior to the trial, a simulated annual declaration was issued. This was a relatively short document involving a simple update of the information provided in the initial declaration. As a result, material balance verification was straight forward, requiring only the addition of changes resulting from activities between the date of the annual declaration and the inspection.

C. DETAILED APPROACH

1. Dates and Duration

The trial was held during the third week of November 1989 and lasted two-and-a-half working days.

2. Mandate

The mandate for a routine inspection of the single small-scale facility was based on the elements of the facility agreement worked out during the planning session.

3. Composition of the Inspection Team

The inspection team was composed of a representative of the Department of National Defence as team leader, a representative from Canadian industry, and five scientists with a variety of backgrounds and experience. At least two of the inspectors were experienced in the preparation of schedule 1 chemicals, one was a practising analytical chemist, and two were widely knowledgeable in negotiations on the draft Convention.

4. Other Participants

The practice inspection was carried out under the direction of a senior scientific officer assigned from the Department of National Defence. He also played the role of a representative from the national authority and participated as an observer. There were also observers from the Arms Control and Disarmament Division of the Department of External Affairs and from the Arms Control Verification Team of the Department of National Defence.

5. Advance Preparations

In addition to the planning meeting, the inspection team was briefed at a half-day meeting the week before the inspection. All relevant material was supplied to the inspectors and observers in advance. This included information from CD/952 and examples of national trial inspection (NTI) reports previously presented to the CD. This material was discussed at the half-day briefing session.

Accommodation, meals and local transportation were arranged by the facility, and a small conference room was provided as a base of operations for the inspectors.

6. Inspection Equipment

All equipment used in the practice inspection, including photographic and safety equipment, was provided by the facility.

7. Measures to Protect Classified Information

Inspectors were treated in a fashion similar to any visitors to the establishment. They were escorted during all movements within the facility. It was not found necessary for the inspectors to have classified information in order to carry out the inspection. It was also not necessary to remove any equipment from the facility prior to the inspection or to shroud any items. The laboratories were left in their normal working state with no special clean-up prior to the inspection. The inspectors generally met and spoke only to those officially involved in hosting the inspection, providing services, or operating the specific facilities inspected.

8. Opening Conference

An opening conference of one-hour duration was held to provide background briefings in order to familiarize all participants with essential aspects of the practice inspection, as well as to update the declarations and answer questions from the inspection team.

9. Orientation Tour

As this was the first visit to the facility by some of the participants, a thorough tour of all areas of the facility, including remote storage and waste disposal sites, was provided for all inspectors and observers. Due to the distances to the remote sites, over four hours was required. At the end of the tour, an inspectors' meeting was held, at which initial plans were reviewed and revised and assignments made for more specific investigations by groups of inspectors.

10. Preparation Facilities

The preparation facilities for synthesis of organic chemicals were closely examined. There were five fumehoods within the single small-scale facility suitable for toxic synthesis at the levels of schedule 1 chemicals, although it was claimed that only two would normally be used for this work. An additional nine similar individually ventilated hoods were found to be present in other areas of the establishment, although not all had quite the same protective capability. It was clearly observed that systems for continuous operation were not available and that all reaction vessels used in synthesis within the facility were less than ten litres in size. In fact, for safety reasons, glass reaction vessels were normally restricted to five

litres or less, and those used in supertoxic lethal chemical or schedule 1 preparations were restricted to two litres or less in size.

11. Records Audited

The records examined included those showing the preparation, storage and transfer to research programs of all schedule 1 chemicals. Precursor inventories were also examined, as were purchase records relating to operation of the facility.

12. Sampling

Two samples were taken and analyzed in order to test procedures. One was from a container of a schedule 1 chemical in storage and the other from a container of decontaminated waste.

13. Analysis

A wide range of automated analytical techniques were available at the establishment, including infrared, gas-liquid chromatography, high-pressure liquid chromatography, nuclear magnetic resonance spectroscopy and mass spectroscopy. The analytical facilities of the establishment were not included in the single small-scale facility as defined for trial purposes, but full access was provided to inspectors as specified in the facility agreement. The complete range of analytical procedures was made available for use by the inspectors as required. The two samples were analyzed using gas chromatography/mass spectroscopy (GC/MS) and spectra were compared with electronically stored libraries including the NBS library and data from the Finnish blue books. Sampling and analysis of each sample took approximately one hour.

14. Documentation of the Inspection

Still photographs were taken by DRES personnel as required by the inspectors. The photographs included most operations carried out by DRES for the inspectors, e.g. sampling, sample transportation and analysis. Photographs were also taken at the remote locations.

15. Closing Conference

A brief evaluation of the trial involving all participants was held during the closing conference. All outstanding questions were resolved.

16. Anomalies

A few minor discrepancies were identified during the practice inspection, but all were easily resolved. None were deliberately introduced.

17. Report of the Inspection Team

The inspectors' report was largely prepared during the inspection. Some general sections were written by the team leader at the operations base as the inspectors were carrying out specific tasks. Other items were contributed by the groups of inspectors that carried out various aspects of the inspection. The draft report was reviewed by the inspectors prior to departure, with final editing occurring off-site the following week.

18. Impact on Facility Operations

Preparation time for the facility, including planning sessions and preparation of declarations, was spread out over several months and involved mainly the efforts of a single staff member. The practice inspection itself occupied a cross-section of facility personnel for three days and involved the shut-down of a number of programs for the same period. Monetary costs associated with the inspection for the facility were not estimated.

D. RESULTS

1. Definition of the Single Small-Scale Facility

Since a pilot plant or other dedicated production facility for schedule 1 chemicals is not used or available in Canada, the section of the research laboratory at the Defence Research Establishment Suffield used for synthesis of organic chemicals, including schedule 1 chemicals, might have to be identified as a single small-scale facility for purposes of the chemical weapons convention. A description of a single small-scale facility based on this laboratory was prepared following the provisions of the rolling text

(CD/952), but some difficulties were encountered in adapting it to verification procedures.

The laboratory is not used exclusively for the preparation of schedule 1 chemicals. It is a multipurpose organic synthesis laboratory. A wide range of synthetic projects, including the preparation and purification of precursor chemicals, is normally carried out there. The activities of the laboratory also include, however, those which could be considered as functions of an SSSF - i.e., the preparation of schedule 1 chemicals. Thus, it was not possible to isolate the single small-scale facility from these other functions.

No schedule 1 chemicals are prepared within the facility at DRES for other than protective purposes, and none have been transferred out of DRES to other locations, either nationally or internationally. Schedule 1 chemicals prepared in the facility have been transferred, however, to other areas of the establishment for consumption in research programs on chemical protection. For trial purposes, and in keeping with the apparent intent of the rolling text, the remaining sections of the DRES research establishment were not included in the declared single small-scale facility. It might be noted that, if a research laboratory such as that at DRES is declared an SSSF, then movement of schedule 1 chemicals for use in other locations in the research establishment can be considered as a transfer.

In applying the model for an agreement relating to single small-scale facilities to the laboratory setting, it was found that some sections of the model could be adapted without difficulty, while others could not. In many ways, the model was more appropriate for a dedicated facility housed in a separate building.

For instance, in the model under section 1(b), "detailed technical information", requirements for site information including pipework, roads, fences, mains electricity, water and gas points did not apply to the synthesis laboratory, nor did nearly all of the flow and process information requested. The provision of lists of equipment for a laboratory filled with research items was found to be very difficult and, in any event, was judged to be of little use for verification. (Glass reaction flasks, common to all organic laboratories, are expendable items and are not normally recorded in inventories.) In addition, the projected use of monitoring systems, while possibly having some value in a dedicated facility, was judged to be of no value whatsoever in a laboratory where a wide variety of similar but unrelated activities are being carried out. As a result, these sections of the model were disregarded during planning for the trial inspection.

The experience of this practice inspection clearly showed that the characteristics of a single small-scale facility, as set out in Annex 1 to Article VI, and particularly as augmented by the model for an agreement relating to single small-scale facilities, need further clarification for organic research laboratories not dedicated solely to the production of schedule 1 chemicals.

2. Facility Agreements

The contents of a facility agreement were found to be of utmost importance. It must not only contribute to the mandate for the inspection but also spell out rights of access, use of equipment, special inspection procedures, sampling and analysis, rights and privileges of both the facility and the inspectors, emergency measures, etc. It must even direct administrative arrangements, including transportation, meals and accommodation. Guidelines to the preparation of these agreements must therefore be quite clear, and a considerable level of detail must also be included if disputes are to be avoided.

Due in large part to difficulties in adapting the model provided in Appendix II to CD/952 to a laboratory facility, a complete facility agreement was not written for the practice inspection, and some disagreements over detail arose during the trial. The preparation of the agreement will involve considerable negotiation among the inspectorate, the facility management and the National Authority, and could be a time-consuming process. It must be initiated and largely completed at the initial inspection or at subsequent additional visits arranged specifically for this purpose. Until an agreement is signed, subsequent routine inspections will be unnecessarily difficult.

During the preparation of the facility agreement, it was thought useful to transform the models for an agreement into pre-prepared, standardized forms, which could be filled out, as appropriate, during initial inspections to make the work of the inspectors easier. An attempt was made to do this for the single small-scale facility model and seemed to work well. However, in order to make the form complete, some details not found in the model had to be added.

3. Declarations

During the preparation of declarations for the practice inspection, it became apparent that some difficulties exist in the declaration requirements for single small-scale facilities found in Annex 1 to Article VI. At present, there is no requirement to provide

information on the schedule 1 chemicals or their scheduled precursors that are stored at the single small-scale facility at time of the convention's entry into force. It was found that such data are essential in order to provide a baseline for the initial inspection. This would assist in negotiating a facility agreement rapidly, especially regarding requirements for access, frequency of inspections and other aspects of the agreement. The initial declaration should provide most of the information currently required in annual declarations.

In addition to the annual declaration of the previous year's activities after the end of the calendar year, Annex 1 to Article VI requires a separate declaration prior to the end of the calendar year regarding projected activities and anticipated production. The value of this process for a research laboratory is hard to assess because of the difficulty in predicting the needs of research programs for a year in advance. Such information will be inaccurate at best. But it could give rise to apparent anomalies during inspections, leading to unnecessary disputes. This declaration, then, was judged to have no value in the practice inspection, and it is difficult to perceive how such information would assist in verification, except possibly to suggest a need for a change in the frequency of routine inspections. The requirement for this declaration should be deleted for a laboratory facility. Alternatively, a projection of yearly activities and production quantities could be added to the declaration of activities for the previous calendar year, with the understanding that such projections are subject to change.

Finally, a requirement to declare formally the intent to operate a single small-scale facility should be added to the initial declaration in order to make this process complete.

4. Frequency and Duration of Inspections

In a facility where schedule 1 chemicals are produced for legitimate purposes, there will be no need to verify their presence or absence. A similar situation will hold for their precursors. Verification activities will concentrate primarily on confirmation of data contained in the declarations and that the facility is not capable of producing much more than one metric tonne of schedule 1 chemicals per year. In a laboratory adapted to the functions of a single small-scale facility, schedule 1 chemicals will probably be prepared only when needed. The quantities produced should not significantly exceed requirements, and thus the amounts retained in storage could be quite small. The threat posed by such facilities to the Convention should be insignificant, and frequent inspections will not be

necessary in the absence of other information that might increase the level of concern. The Canadian experience would suggest that annual inspections should be appropriate for this type of facility. Only when quantities approach the one metric tonne limit should more intense verification measures be considered.

After the initial visit has been carried out and a facility agreement completed, verification activities during subsequent routine inspections at a laboratory-type single small-scale facility should be straightforward and brief. Although the practice inspection took two-and-a-half days to complete, much of this time was required because activities were being attempted for the first time. It was estimated that a repeat inspection could be carried out in one working day or less by a team of experienced inspectors.

5. Travel Time

For the practice inspection, the inspectorate was not required to bring equipment so that travel by commercial transport was considered to be appropriate and cost effective. Most of the inspectors left their homes in Eastern Canada early in the morning (equivalent to point of entry), used a commercial flight to Calgary, and then proceeded to Medicine Hat by ground transport provided by the facility. Arrival was late in the afternoon. No inspection activities were possible during the evening and night hours when the facility was closed. The inspection officially commenced the following morning after the opening meeting. The time period from departure in the East to initiation of the inspection was about twenty-six hours. This was under good conditions, with no delays en route (although the road from Calgary was closed by a snowstorm shortly after the inspectors had passed). Few other timing options were available using commercial air travel; a reduction of the time involved would have required night time travel, highly expensive dedicated aircraft, or night operations. This experience illustrates the difficulty in attempting to adopt procedures designed to shorten the warning time for surprise inspections and the potentially high costs of such measures.

6. Inspection Team

A total of seven inspectors were utilized for the practice inspection. This was a larger group than would normally be needed for a routine annual inspection at a single small-scale facility of this type following completion of the initial inspection and the inspection agreement. Five inspectors would be adequate, or even four if the team leader could also act as an inspector. The

development of standard formats for reports would help ease the burden. It was agreed that inspectors should operate at least in pairs in order to provide corroboration of all observations, although the team leader could pursue some functions alone at the operations centre.

For the inspection of a single small-scale facility, the practice inspection showed clearly that the inspection team must possess a variety of skills. At least one must be highly knowledgeable in sampling and analytical techniques, and one or more should be thoroughly trained in areas related to record keeping, bookkeeping and purchasing procedures. Others should be skilled in organic chemistry or in process engineering. Knowledge of general practices in organic synthesis laboratories is essential, and similar knowledge about pilot plant processes would be desirable.

The inclusion of support services with the inspection team must be considered. During the practice inspection, all such services were provided by the facility. However, in a real international inspection, this may not be possible or desirable. It could be necessary to have interpreters as part of the inspection team. The inspectors should have the authority to record photographically or otherwise the inspection process, and portable computers should be available to prepare records and reports.

Guidelines for the composition of inspection teams in terms of numbers, skills, training and experience should be worked out during the preparation period.

7. Inspection Equipment

The practice inspection indicated that very little equipment would be needed for routine inspections at a single small-scale facility. If the facility is located at a laboratory, adequate analytical facilities and safety equipment should be available. The trial showed that such facilities and equipment could successfully be used for verification so long as a proper relationship exists between the inspectors and the facility. Requirements would be determined at the initial inspection and spelled out in the facility agreement. Photographic and video equipment must be under the control of the inspectors and may have to be brought with them. A portable word processing system and small printer for preparing reports would also be useful.

8. Security of Information

During the practice inspection, there was no hesitation on the part of the facility management to allow access by the inspectors to all areas relevant to

verification of the single small-scale facility, including neighbouring laboratories with similar fumehoods, roof stacks, waste disposal areas, analytical facilities, storage facilities and remote field sites. The tour and other inspection procedures involved a thorough examination of the areas visited; however, because it was a typical laboratory, there was little to be seen that was unique or sensitive, and the consequences of these intrusive measures were not found to be controversial.

Photography was found to be most important for recalling observations; however, in some states or facilities, photo and video records may be considered sensitive if taken outside the facility. It may be necessary to store such records at the facility in secure sealed cabinets between inspections, but they would normally be most useful to inspectors during preparations for the next inspection. Arrangements with the facility management for the handling of photographic records must be included in the facility agreement.

Generally little or no classified information was found to be exposed during the practice inspection of the simulated single small-scale facility. No classified commercial information was involved. (The main point at which classified information could have been divulged would be through examination of the purposes for which the schedule 1 chemicals prepared in the facility were used.)

9. Production Capacity

The determination of production capacity was found to be a key element in verification at the facility. In practical terms, the factors which limit the quantities of schedule 1 chemicals made in a synthesis laboratory are the number and quality of the fumehoods and the size of the reaction vessels that can be used in them. From information provided in the initial declaration, and given the safety regulations in force, it could be calculated that the maximum yearly production from a full-time, dedicated process in the facility would be no more than sixty kg per fumehood. It was apparent that this type and size of facility was not a significant threat to the objectives of the Convention. Further verification then became a simple matter of confirming the data provided in the declarations.

With reference to Annex 1 to Article VI and the size of reaction vessels, the capacity of vessels used in a research laboratory-type facility could easily be restricted to ten litres, although the DRES facility uses vessels of considerably smaller capacity. Typical pilot plant vessels, as might be used in a dedicated facility, however, can range up to several hundred litres. A one-hundred-litre limit

imposed on them might be inconvenient, but it could probably be accepted. A facility with vessels of this size would pose a much more serious risk to the Convention, especially if several such vessels were available. Inspections would need to be more frequent and at unpredictable times with a minimum of warning. Sampling and analysis of waste products could become important for verification. The purchase or possible synthesis of precursors would have to be monitored carefully. A trial of a dedicated single small-scale facility, possibly a pilot plant, should one be available somewhere, would be most useful in testing these factors.

10. Production Quantities

Perhaps the most useful means of monitoring production quantities would be through inventory control of precursor chemicals. As most precursors are obtained from commercial sources, all schedule 1, 2 or 3 precursors coming into the facility should be identifiable by quantity and lot number. Usage of these precursor chemicals at the facility should be recorded by lot number, quantity and date. A similar record should be maintained by the facility when precursor chemicals are prepared on-site or obtained from non-commercial sources. These procedures would allow a running balance to be maintained, and the information could be compared with data from commercial sales. In industry, a system of audit trails for chemicals is normally required by law; similar procedures could be required for single small-scale facilities under the chemical weapons convention. In view of the adoption of Laboratory Information Management Systems (LIMS) by industrial laboratories, this might form a model for a system to be used in single small-scale facilities as a means of aiding verification.

11. Sampling and Analysis

During the practice inspection, it became apparent that the taking and analysis of samples at a single small-scale facility may add little useful information to the verification process. Schedule 1 chemicals and their precursors were legitimately present and required only a few random checks to confirm their identity. However, it was considered essential that the inspection team retain the right to have any sample it wished analyzed, either on-site or at a designated laboratory. Procedures for sampling and analysis must be clearly spelled out in the facility agreement.

One possible role for sampling at a single small-scale facility would be to demonstrate, by the analysis of waste products and possibly air and soil samples, that larger quantities of undeclared schedule 1 chemicals had not

been prepared recently at the site. For instance, it was observed that waste water from DRES (including that from the single small-scale facility) was delivered directly to an isolated two-pond lagoon purification system. While samples were not taken from the lagoon during the practice inspection, it was estimated that analysis of the water would likely show the presence of degradation products if militarily significant quantities of schedule 1 chemicals were being prepared in the facility. Baseline measurements, however, would be required.

All sampling and analysis for the practice inspection was carried out by facility personnel. To overcome the possibility of deception, an identifying "spike" was added by the inspectors and the process observed continuously. Thus, if done with care, samples can be taken and accurately analyzed by the facility. However, it was also quite apparent that without the presence among the inspectors of an analytical chemist thoroughly knowledgeable in the techniques and equipment being used, the inspectors would not have been aware of any inaccuracy in the analytical results, should the facility scientists have attempted a cover-up.

This problem might have been partially overcome by the removal of samples to neutral off-site laboratories for analysis. Apart from the extra skills, time and effort required, the transport of highly toxic samples is a hazardous process and should be avoided if possible. Nevertheless, there must be the capability for removal of samples off site. Analytical equipment could have also been brought to the site by the inspectors, but this should be done only if cost effective. This would seem to be unlikely for the few samples that may be needed during a routine inspection of a single small-scale facility. The use of analytical instruments belonging to the facility would appear to be the best option despite the opportunities for deception.

12. Inspection Report

An extensive inspection report did not appear to be needed, at least insofar as routine verification of a single small-scale facility of this type is concerned. The initial report might be more extensive, but once it is agreed that the facility is in compliance, for subsequent annual inspections, reports should deal mainly with confirmation of declared data and the effects of any changes at the facility. In most instances, it should be possible to report on these in a few paragraphs.

Inspectors, as they gain experience, can be expected to develop standard formats to shorten the

reporting process. This should, in most circumstances, allow completion of reports before the inspectors leave the facility. It should be possible to arrange a series of trial inspections at various types of sites so that the newly formed international inspectorate can gain experience and work out the most suitable approaches to procedures, the preparation of reports, and the development of facility agreements.

E. CONCLUSIONS AND RECOMMENDATIONS

The Canadian practice inspection successfully demonstrated the feasibility of carrying out routine verification inspections at a single small-scale facility preparing schedule 1 chemicals for protective purposes without compromising sensitive or secure facilities, equipment or operations. All aims of the trial were achieved, although some difficulty was encountered in adapting the single small-scale facility model to a research laboratory site. The practice inspection was sufficiently realistic to test the practicality of inspection procedures, and the results provide excellent guidance for further negotiation of the draft Convention on Chemical Weapons. A number of factors emerged that illuminated practical features of the inspection procedures. Some of the results bore directly upon entries in the current rolling text (CD/952), suggesting useful modifications and improvements.

Based on the results of the Canadian practice inspection, the following recommendations can be made for changes or improvements in procedures that may affect the rolling text.

a) The characteristics of a single small-scale facility set out in Annex I to Article VI and developed further in the model facilities agreement in Appendix II are not entirely appropriate for a facility which consists of a multipurpose organic synthesis laboratory. Further trials of such facilities are required, especially at dedicated sites, and the model for an agreement relating to single small-scale facilities should be reviewed. Pre-prepared forms for facility agreements could simplify the work of inspectors and should be developed.

b) The proposed installation of on-site monitoring systems, while perhaps having some value with respect to a dedicated synthesis or pilot plant facility, is not relevant to a multipurpose laboratory facility. This concept should be reviewed as to its being mandatory.

c) The initial declaration for a single small-scale facility should include a declaration of intent to operate such a facility, as well as most of the information

currently required for annual declarations. In particular, it should include a statement of the quantities of schedule 1 and schedule 2 chemicals possessed as of entry into force of the Convention, in order to provide a basis for the initial inspection and preparation of the facility agreement.

d) The requirement to submit annually a separate declaration regarding projected activities and anticipated production is unnecessary for a multipurpose laboratory facility. This provision should be modified.

e) A laboratory-type single small-scale facility would pose a much less serious risk to the Convention than a dedicated facility and would therefore require less frequent inspection.

f) Guidelines are required for the composition of inspection teams in terms of numbers, skills, training and experience. These should be worked out during the preparation period.

g) The most useful means of monitoring the quantities of schedule 1 chemicals produced at a single small-scale facility may be through inventory control of precursor chemicals. A system of audit trails for chemicals and laboratory information management systems should be adopted by the facility managers to assist in verification.

h) A series of trial inspections at various types of sites should be arranged to gain experience and work out the most suitable approach to implementation of verification procedures.

CONFERENCE ON DISARMAMENT

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LETTER DATED 19 APRIL 1990 FROM THE PERMANENT MISSION OF INDIA ADDRESSED TO THE SECRETARY-GENERAL OF THE CONFERENCE ON DISARMAMENT TRANSMITTING A DOCUMENT "REPORT OF THE NATIONAL TRIAL INSPECTION CONDUCTED BY INDIA"

I have the honour to enclose a document entitled "Report of the National Trial Inspection conducted by India". I would be grateful if this could be circulated in the Conference on Tuesday, 24 April 1990, as a CD document.

(Signed) ANIL WADHWA

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REPORT OF THE NATIONAL TRIAL INSPECTION CONDUCTED BY INDIA.

Introduction

This document presents the results of the National Trial Inspection that was carried out during three visits to the production facility of Searle India, Bombay, a multi-purpose unit manufacturing a variety of drugs. The facility of M/s Searle India was selected for trial inspection purpose. The facility is manufacturing diisopyramide phosphate from DIPC alcohol which is initially converted to DIPC hydrochloride (DIPC Hcl) and then to nitride pyramixetosylate. Another product, propantheline bromide is also produced by esterification of xanthanoic acid with DIPC Hcl. The feedstock, DIPC alcohol and the chemical DIPC Hcl are listed in the section of Schedule [2] chemicals.

The inspection served to test the adequacy of the system of verification provided in the draft Chemical Weapons Convention, in the context of its objectives to ensure 'A'. The inspection also provided an opportunity to test the degree of intrusiveness required to conduct the verification procedures even while protecting commercial confidentiality.

The results of the Indian national trial inspection presented below, conform generally to the format contained in document CD/CW/WP.213.

A. GENERAL APPROACH

1. Objectives of national trial inspection

The objectives of the National Trial Inspection were those set forth in document CD/CW/WP:213.

2. Provisions in the draft convention under which the trial inspections took place

These were in accordance with the provisions contained in the Annex to Article VI[2] of the rolling text of the draft Chemical Weapons Convention.

3. Type of on-site inspection

An initial visit by the inspection team was made on April 8, 1989 for familiarization purposes, for obtaining information relevant for planning the future verification activities at the inspection, to determine the precise inspection plan and to work on the facility attachment agreements. A second visit by a very small

group of inspectors took place on July 4 and 5, 1989 in order to finalize the facility attachment agreement. The final inspection took place on August 9 and 10, 1989.

4. Advance information

a) Declarations

At the time of the initial and second visit, the firm made the relevant declarations concerning the production during the past 5 years of the above mentioned chemicals and made available all other relevant information required by the inspection team.

b) Agreement on inspection procedures

The team negotiated and finalized a facility attachment based on the "Model for an agreement relating to facilities producing, processing or consuming chemical listed in Schedule [2] (CD/874 pp 125-128), with which the management of the private sector firm, Searle India Ltd, did not have any problems.

5. Type of facility inspected

The facility inspected is a multi-purpose plant manufacturing specialty chemicals related to bulk drugs and intermediates.

6. Types of declared activity at the facility.

The facility handles and produces small volume of Schedule [2] chemicals i.e. maximum 1.6 MT per year. These chemicals are stored along with other solvent and chemicals. The basic raw material, DIPC alcohol, is imported once or twice a year and consumed in a short period of 4 to 8 batch runs, as and when there is demand for the drugs.

7. Actual activity at the facility

At the time of the initial and second visits, the facility was manufacturing other chemical materials not related with Schedule [2] items. The inspecting team decided deliberately to schedule the final visit for a routine on-site inspection, to coincide with the batch run in which scheduled chemicals were processed and produced in order to check the efficacy of the verification process.

B. DETAILED APPROACH

1. Composition of the inspection team

The team consisted of the following persons-

i) Team Leader: Joint Secretary(Chem), Ministry of Petroleum & Chemicals, Government of India.

ii) one chemist;

iii) one chemical analyst;

iv) one chemical engineer;

v) one chemical technologist; and

vi) one auditor.

Besides the requisite technical expertise for conducting a trial inspection, the team included representatives from the Ministry of Petroleum & Chemicals, the nodal Ministry in Government of India for the chemical industry, the Ministry of External Affairs which oversees the negotiations on the draft CW Convention.

The team negotiated the inspection mandate after explaining the Chemical Weapons Convention with the company's team which consisted of the following officials:

i) Production Director

ii) Director, Research & Development

iii) Works Manager

iv) Production Manager(Chemicals)

v) Manager, Quality Assurance

vi) Production Services Manager.

2. The negotiation covered the following subjects

i) The plant area to which the inspection team should have access for routine on-site inspection, including the collection of samples for analysis.

ii) Records to be made available to the inspecting agency.

iii) Facilities and services to be provided by the company.

iv) Right of the inspectors to examine the operations of the company pursuing the identical processes.

3. Inspection equipment

The portable equipment carried by the inspection team for the routine inspection included liquid and gas samplers, an auto-titrator, a gas-liquid chromatograph, PH meters and refracto meters. All the other technical equipment used was provided by the company from its in-house R&D laboratory.

4. Activities prior to the arrival of the inspection team on site.

The date of the routine on-site inspection was chosen on the basis of mutual convenience and after confirming that the batch runs of Schedule [2] chemical would be undertaken by the company on the said dates.

5. Advance preparation on site

The Managing Director of the Company informed the team leader of the arrival of the imported DIPC alcohol and the likely dates of the production schedule. The visit was undertaken on a day when a new batch was taken up for production.

6. Escort and points of contact arrangements.

The company provided adequate staff to act as escort as also to answer the routine queries made by the inspecting team. The company designated certain officials as the contact persons for the duration of the trial inspection.

7. Other participants

A representative from the Disarmament Unit of the Ministry of External Affairs, Government of India was present during the routine inspection.

8. Duration of initial visit and inspection

- Initial visit - one day, (5 persons).

- Preparatory facility attachment - two days, (3 persons).

- Actual inspection - 1 day (4 persons)

- Inspection report programme - 2 days (3 persons).

9. Measures to protect confidential information

The inspectorate discussed with the company officials the various types of confidential information which fall under the following. The four levels of classification:

a) releasable to the public

b) releasable to the States parties to the convention.

c) limited to the technical secretariat; and

d) available to inspectors only - not to be removed from the company premises.

Detailed process diagrams and documents incorporating procedures were not removed from the site.

10. Opening conference

The team leader spelt out the purpose of the national trial inspection to the members of the inspection team and company representatives. The Company's Managing Director, along with his identified officials discussed their activities at the facility and the various safety measures adopted. The opening conference lasted for about two hours.

11. Types of records needed and/or audited.

The company maintains good records of the raw materials including the imported materials. The company made available to the inspection team the following plant protection records and financial statements:

Plant production records

i) Log books, being maintained on a daily basis, showing product batch numbers in progress and kettle numbers in use of various batches of products in the factory.

ii) Production record card, maintained batch-wise, showing production of each batch, giving details of materials charged.

iii) Production report of various products, along with batch numbers, prepared on a monthly basis, giving details of monthly and cumulative production. This also gives process information.

iv) Plant information is given in the above reports.

v) Production report for individual batches of DIPC Hydrochloride and N.P. Tosylate, etc. are maintained and were made available to the inspection team.

Financial statements

Regarding receipt and issue of diisopropyl amino ethanol (raw material), the following documents/records are maintained:

1. Purchase order on the foreign supplier.

2. Opening of Letter of Credit.

3. Bill of Entry at the time of receipt of material in India, i.e. the Excise/Custom documents.

4. Railway Receipt at the time of receipt, on site, at the Searle India factory.

5. Entries in the Stores Ledger.

6. To have strict control for the use of diisopropyl amino ethanol, the following registers are maintained:

   a) Stock register of diisopropyl amino ethanol and DIPC Hcl.

   b) Note book for special enclosure inside the stores for locking/unlocking at the time of receipt and issue of the material in/from the stores.

7. As soon as diisopropyl amino ethanol is converted into intermediate products, the production department keeps a record of the same and in case the material is not used immediately, it is transferred to the stores for safe custody, as

per established procedure, and got reissued as and when required.

8. The record of products viz. diisopyramide Technical and propantheline bromide, transferred to the Searle India unit at Ankleshwar or for outside sale under Excise Gate pass, as per Excise Rules are maintained.

12. Plant orientation tour.

The orientation tour on the plant covered the total facility excepting the pharmaceutical manufacturing, packing and storage sections, as per the attached site plan vide Annexure I.

13. Inspection of areas and facility equipments

The following facility area was inspected in detail:

1. Raw material storage.

2. Chemical manufacturing and plant room.

3. Effluent treatment.

4. Drying annex.

5. General store.

6. Incinerator shed.

7. R&D Centre.

8. Quality Control Lab.

At the time of the initial familiarization visit, the inspection team had also been taken to the areas mentioned above. At that stage, no special area had been earmarked within the stores for keeping the Schedule [2] raw material. The team advised the Company's Management to store the Schedule [2] chemical feedstock (which is imported) in a more safe and secure location. The Company acted on this suggestion and during the routine on-site inspection it was observed that the chemical feedstock had been placed within the storage area in an enclosure especially earmarked for it and to which access was confined to authorized personnel only.

14. Inspection of areas and facility equipments.

In the presence of the inspection team, one batch was charged and the operation was followed up for the next two days by one member of the team to confirm the yield of the batch. During the inspection, the inspectors paid special attention to complete details in order to ensure that the facility was not involved in any undeclared activity. The inspection team was satisfied with the records and details made available by the facility representatives.

15. Sampling and sample taking procedure

The sampling was mainly performed by the company's personnel in the presence of the inspectors, based on the agreed areas of sampling. The samples analyzed in the company's laboratory included the raw materials, stack and effluent water samples, as also the finished products.

The company also agreed to monitor air samples at the facility during the production process as well as samples of water used for cleaning the vessels after the production of each batch.

16. Handling of samples

As per the negotiated facility attachment with the company, the inspection team supervised both the sampling and the on-sight handling of the samples. The company made available the analytical data of the identified samples.

17. Types of samples

The analysis of the samples was done by the company following a standard procedure which was discussed with the inspection team and found to be adequate for the purpose.

18. Types of analysis

During the negotiation of the facility attachment, the company agreed on the following types of analysis -

- The raw materials and the products to ensure that they were in conformity with the chemicals declared.

- The finished product analyzed as per the standard procedure.

- The air and water samples analyzed as per the statutory requirements of the State Government which were found to be comprehensive.

19. Documentation of the inspection

The basic material flow and process diagram was made available to the inspection team. A report was prepared by the inspection team based on the general data given by the company for input material and the finished product. The company management desired that the process details be considered as classified information and should not be permitted to be taken out of the premises. For this purpose, the company agreed to provide space for retaining the documents under lock and key of the inspection team.

20. Evaluation by inspectors

The following information were gathered during the visit of the evaluation team.

- The possibility of undeclared conversions between routine inspections;

- The level of accuracy of the data made available by the company.

- The various difficulties that could be encountered during the actual inspection. This aspect was discussed in detail after the inspection with the company management.

21. Closing conference

The closing conference lasted for approx. two hours and centered round the aspects outlined in Item 20. The question of level of confidentiality was discussed. The company desired that the analyses of the samples be done for the present in the in-house facilities located at the production site itself.

22. Anomalies, disputes and complications

During the inspection, there were no anomalies, disputes and complications.

23. Report of the inspection team

The report was prepared off-site a week following the inspection. The team was of the view that in the case of routine, on-site inspections, no violations were

found or no anomalies, disputes or complications existed, the format of the report could be shortened and simplified.

24. Impact of the inspection on facility operations

The inspection did not affect the normal production programme of the company.

C. SPECIFIC ASPECTS - CONCLUSIONS

1. The inspection mandate

The facility attachment was based on the understanding that it would be only that part of the facility which would be processing or consuming the Schedule [2] chemicals, which is the subject of inspection. The facility attachment was worked out on this basis and the inspection was conducted accordingly.

2. Composition of the inspection team

The team chosen for the trial inspection, excluding the team leader, consisted of the following :

- one chemist;
- one chemical analyst;
- one chemical engineer;
- one chemical technologist; and
- one auditor.

This team was found to be adequate for the national trial inspection. A large part of the time of the inspection team was consumed in verifying the records during the trial inspections, as it included total audit of the documentation relevant to the declared Schedule II chemicals. Since each batch takes approximately 60 hours, it would take approximately three working days of an inspection team to perform the inspection appropriately.

3. Inspection equipment

During the trial inspections, no inspection equipment was taken and only routine inspection was done due to the intermittent schedule of production of Schedule [2] chemicals in the facility.

4. Activities prior to the arrival of the inspection team on-site

The production and consumption of the Schedule [2] chemicals at the production site is not of continuous nature and is undertaken based on the demand for the drug in the market. This inspection was undertaken after the company confirmed receipt of the imported DIPC alcohol and their production schedule.

5. Advance preparations on site

The company arranged for a room for the opening and closing of the conference and cooperated fully with the inspection team.

6. Escort and Point of contact arrangements.

The Management of the company cooperated fully and the Managing Director himself escorted the inspection team during the routine, on-site inspection and was available for the entire duration of the from the day of the final inspection.

7. Other participants

A representative from the Disarmament Unit of the Ministry of External Affairs, Government of India was present during the routine inspection. His presence ensured familiarity of the inspection team with the draft Chemical Weapons Convention and facilitated the adoption of procedures in consonance with the guidelines for inspection elaborated so far under the Convention.

8. Duration of initial visit and inspection

The duration of the initial visit and negotiation of the facility attachment took a total of three days and the actual, routine on-site inspection took another day, with two additional days for completion of laboratory analyses, this appears be reasonable to allow for inspection of most facilities.

9. Measures to protect confidential information

A detailed discussion was held during the negotiation under the four level classification system for confidential information. Agreement was arrived on which information came under each category. Necessary arrangements were made for maintaining confidentiality during the inspection. The Managing Director of the company was particularly concerned with the level (d) concerning the information "available to inspectors

only - not to be removed from the company premises". The company provided an on-site plan of the complex and a detailed flow chart for the production of the drug on a clear understanding that it contained confidential information not to be divulged to any outsider. The company insisted that these documents should not be removed from the company site and to be returned to their Chief Chemist at the end of the inspection. The company desired that the following information be also covered under level (d) -

- The annual consumption/production;

- Purchase price of feedstock chemicals;

- Customer, buyer product reports.

10. Opening conference

Depending on the complexity of the operation, the opening conference could last 60-90 minutes.

11. Types of records needed and/or audited

Conscious of this fact that the facility inspected handles Scheduled chemicals in a non-continuous manner through a batch process and that future inspection may not be possible exactly at the time when such a batch process is in progress, the Inspection Team paid special attention to the examination of documentation and material balance.

The inspection team felt that the company maintains good records of raw materials and final product. These records were well documented.

The inspection team concluded that the records examined were consistent with the company's declaration. It was satisfied that the company did not undertake production of any other undeclared chemicals and that the scheduled chemical was used for the production of drugs only in one facility. The yield, however, was persistently low since the very inception of the company and this was brought to the notice of the management. The latter explained that they are seized with this problem and are trying to find out ways and means to improve the yield.

12. Plant orientation tour

The plant orientation tour lasted for about 70 minutes and was found to be extremely useful for familiarizing

the inspection team with the physical layout of the facility.

13. Inspection of areas and facility equipment

A general inspection of the plant is necessary to enable the inspection team to understand whether the declared chemical process is being followed and whether there are possibilities of production of undeclared items. The inspection team felt that at the opening conference itself, the question of inspecting the site along with the full lay-out of the factory and the equipments positioning be discussed to make the inspection effective. The area and the facility equipment inspections are as indicated under Item B-13.

14. Inspection of operation procedures

In order to verify the declared chemical production process, it was necessary for the inspection team to be present at the time of charging of the chemicals, sampling and at the concluding stage of the reaction process.

15. Sampling and sample taking procedure

Use of sample taking devices and monitoring equipment were considered very useful to confirm the production process and the composition of chemicals under processing. The sampling procedure has to be in tune with the type of facility being inspected. Three samples required to be collected for cross-checking purposes. The sampling of the stack and effluent water would need special devices which could determine nanogram levels of the chemical in question.

The company officials stressed that while the company would cooperate in providing facilities for collecting and analyzing the samples as were available with them, the inspection team would be free to use their own methods of analysis, standards and additional equipments, if required.

16. Handling of samples

The company expressed no difficulties with regard to the method of handling of samples as contained in Item B-16. The company, however, insisted that the technical information with regard to the process details be given suitable protection and the samples drawn should be handled, keeping this in mind.

17. Analysis of samples

The ready access to the analytical procedure and availability of a good analytical laboratory is indispensable for precise analysis of samples. Before trial inspection takes place, it would be imperative to ensure that the analytical procedure, the reference samples and suitable analytical facilities are lined up for processing of the samples.

18. Types of analysis

The company, while agreeing to provide all facilities for analysis of the samples, stressed the need for confidentiality of the information.

As brought out earlier, the production of the drugs are need-based and the facility is never in continuous use. While negotiating the facility attachment, the company expressed no objection to drawing up of the samples of the feed chemicals of the final products. In order to ensure that the facility is used only for the declared chemicals, it would be necessary to arrange on-site analysis, adopting negative proof methods to ensure that at the time of inspection, other chemicals in Schedule [2] or Schedule [1] were not being manufactured.

19. Documentation

The inspection team felt it essential to consult the Management of the facility with regard to the level of confidentiality of the information before these could be released for use by various authorities. For this purpose, it would be advisable to have the inspection reports fully seen and cleared with the concerned company for further processing. This is considered imperative as the various technologies developed to manufacture products at higher efficiencies deserve protection from competitors. The inspection team noticed that the management of the facility cooperated well with them on the clear understanding that they do not run the risk of losing the confidentiality of their process know-how and other important privileged, commercial information.

20. Evaluation by inspectors

The Inspection Team felt that before undertaking the inspection, a detailed discussion amongst the team members was essential to divide responsibility amongst its members to cover the various facets laid down for

the inspection. This, facilitates the actual inspection, collection of samples, analysis of the samples, audit inspection of the various documents and the other related activities.

21. Closing conference

The closing conference was considered essential to fill in the various gaps identified during the process of the trial inspection. It is desirable to have a detailed closing conference with the designated staff of the facility.

22. Anomalies, disputes and complications

In the inspection, there was no disputes, complications and anomalies primarily because of the excellent cooperation extended by the top management of the facility. There was little chance of complication as the production and use of Schedule [2] raw materials was confined to one facility only. The abnormality identified by the inspection team, namely, the extremely low yield of the final product, is sought to be rectified by the management through concerted R&D efforts.

23. Report of the inspection team

The inspection team generally felt that the report could be prepared keeping the confidentiality aspect in mind and would suitably sub-divide the report to safeguard the confidentiality of the process. The classification would be based on the judgement with regard to the level of information which could be made public and the other which could be made available to the States Parties to the convention or to the Inspectors only during the inspection, and kept under safe custody at the facility premises.

24. Impact of the inspection on facility operations

During the inspection of the facility, there was no loss of production as it was easy to sample both the raw materials which were fed into the reactors and the finished product which became available at the end of the 60 hour cycle. There was no scope for any intermediate sample collection as the reaction was performed under closed conditions.

It was only during the routine,on-site inspection that the designated staff of the company had to spare half a day to escort the inspection team in the facility and

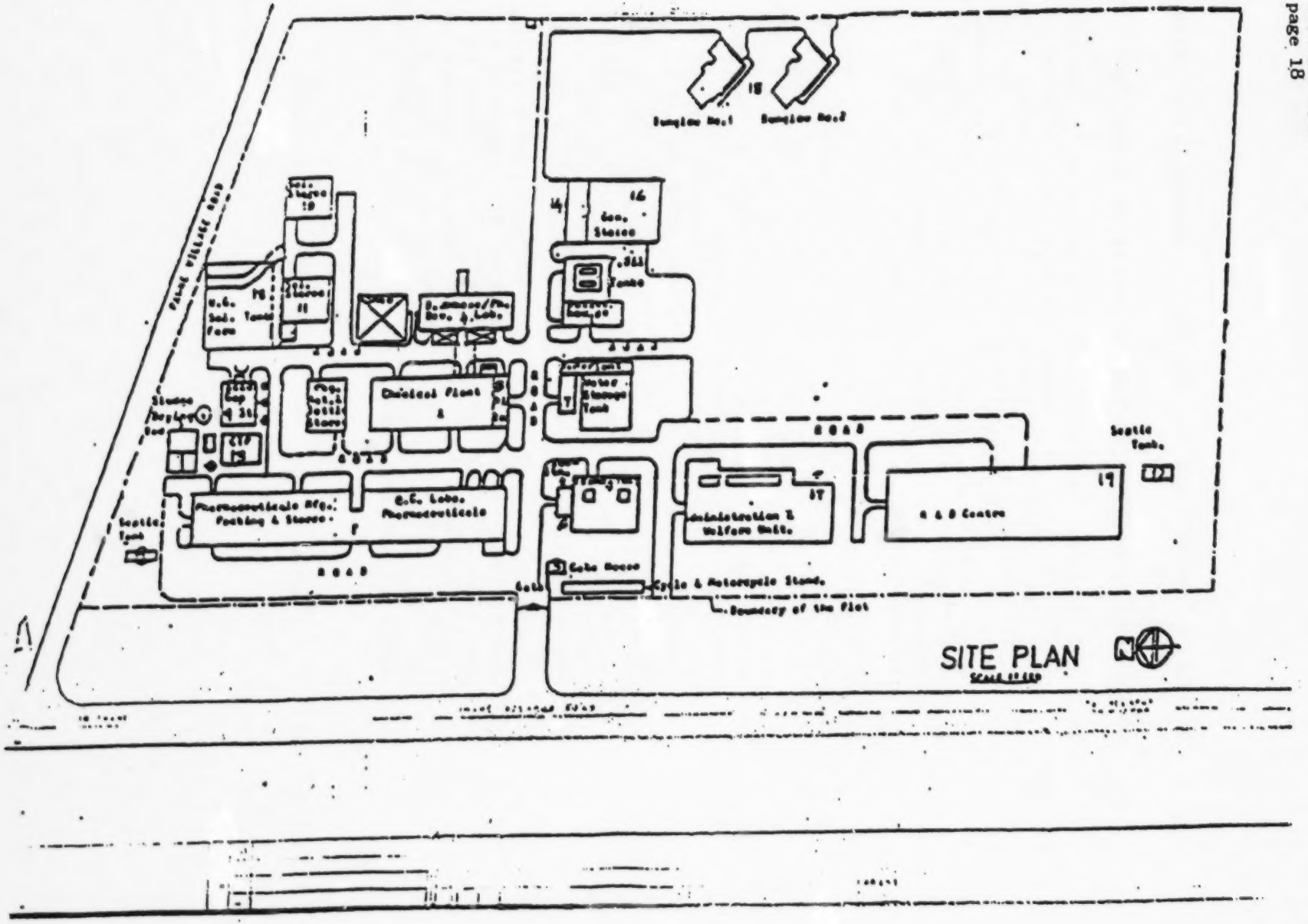
answer to the various queries raised during the process of inspection.

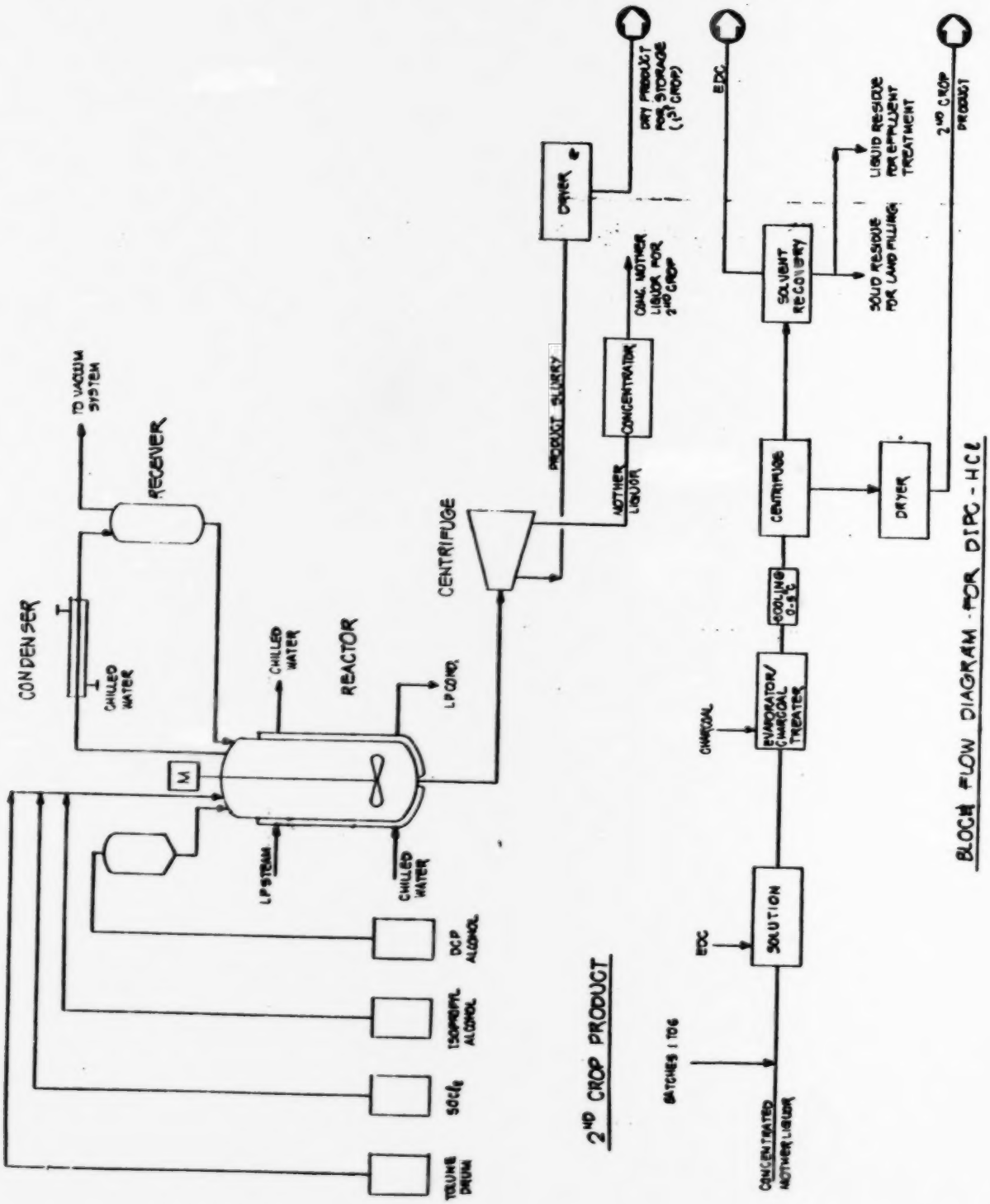
D. SUGGESTIONS FOR REFINING THE VERIFICATION PROCEDURES

1. Inspections carried out when the scheduled chemical is not being produced or processed in the production facility should not deter the inspectors from having access to the facility for on-site verification of the process equipment. Such inspection should, however, rely upon data verification and material balance and stack sample analysis to eliminate the possibility of the manufacture of any of the scheduled chemicals.

2. The international inspectors shall submit a report of their findings to the Director General of the Technical Secretariat and on the basis of which it would be determined whether the activities of the facility inspected are in conformity or otherwise with the provisions of the Chemical Weapons Convention. A standardized format listing a 'Yes' or 'No' type questionnaire, with brief comments by the inspectors as to how they arrived at their conclusions could be elaborated to overcome any difficulties regarding the interpretation of the inspection of any facility. In case the facility inspected is in order, the inspectors report could be brief and factual, rather than descriptive.

3. During the verification process, the international inspectors will handle chemicals for sampling and analyses. For ensuring safety, the inspectors could adhere to the safety procedures already in force within the facility, and in conformity with the regulations laid down by the national authorities concerned.


Bungalow No.1
Bungalow No.2
Chemical Plant
Pharmaceuticals Pkg. Packing & Storage
G.D. Labs. Pharmaceuticals
Administration & Welfare Unit.
A & B Centre
Seattle Tank.
Cycle & Motorcycle Stand.
Boundary of the Plot
SITE PLAN


TO VACUUM SYSTEM
RECEIVER
CONDENSER
CHILLED WATER
CHILLED WATER
REACTOR
LP STEAM
CHILLED WATER
LP CONDN
CENTRIFUGE
PRODUCT SLURRY
MOTHER LIQUOR
CONCENTRATOR
CONC. MOTHER LIQUOR FOR 2ND CROP
DRYER
DRY PRODUCT FOR STORAGE (1ST CROP)
EDC
SOLVENT RECOVERY
LIQUID RESIDUE FOR EFFLUENT TREATMENT
SOLID RESIDUE FOR LAND FILLING
2ND CROP PRODUCT
CENTRIFUGE
DRYER
COOLING 0-5°C
EVAPORATOR/ CHARCOAL TREATER
CHARCOAL
SOLUTION
EDC
BATCHES I TO 6
CONCENTRATED MOTHER LIQUOR
DCP ALCOHOL
ISOPROPYL ALCOHOL
SOCl2
TOLUENE DRUM
2ND CROP PRODUCT
BLOCK FLOW DIAGRAM FOR DIPC-HCl